March 15, 2010

Certified Mail No. 7006 2150 0005 1859 6690
Return Receipt Requested

Richard Goodyear, P.E.
Permit Programs Manager
Air Quality Bureau
New Mexico Environment Department
1301 Siler Road, Building B
Santa Fe, NM 87507

Re: **Permit No. 325-M-9, Rev.23 - Technical Permit Revision**

Dear Mr. Goodyear,

Pursuant to 20.2.72.219.B NMAC, Intel submits the attached revisions to NSR Permit 325-M.9, R23 (Permit). The revision includes changes to emission factors for the 1250 BHP boilers and the Durr thermal oxidizers (RTO), inclusion of new emission factors for miscellaneous gas sources, and changes to requirements for emergency generators, emissions calculations, thermal oxidizers, testing, recordkeeping and reporting.

Emission Factors

1250 BHP Boilers
Condition 2.C.ii.f of the Permit requires Intel to evaluate the emission factors used to calculate the Nitrogen Oxides (NOx) and Carbon Monoxide (CO) emissions from the 1250 BHP boilers annually, and update the factors, as necessary, based on the most recent three years of operational data. In accordance with the condition, Intel has evaluated the testing and operational data and determined that the emission factor do not require updating (see Enclosure 1 for data).

Thermal Oxidizer NOx & CO EFs
Intel requests that the emission factor for NOx for the Durr RTOs be updated using the hourly maximum emission rates from the past two years of FTIR testing and average natural gas consumption rate from the past two years. The emission factor for CO will remain the same. The emission factors for the Munters RTOs emissions will continue to be based on AP-42 emission factors until there is two years of testing data and site specific emission factors can be developed. Enclosure 2 contains the summary operational and testing data used to calculate the proposed NOx emission factor for the Durr RTOs.

Miscellaneous Natural Gas Sources
Intel is requesting the addition of emission factors in Table 1 for miscellaneous natural gas sources. To be consistent with the new greenhouse gas regulations, Intel will start reporting combustion emissions from all equipment that uses natural gas. Miscellaneous sources include equipment like kitchen stoves, hot water heaters and other small fuel burning equipment. The emission factors are based on AP-42 are as follows (all units are $lb/10^6 scf$):

TSP/PM10	SO$_2$	NO$_x$	CO	VOC	EF Basis
7.6	0.6	100	84	5.5	AP-42 Tables 1.4-1 and 1.4-2

HAP and VOC EFs

The proposed revision reflects the following changes to the emission factors:

1) Inclusion of the process changes at the site that already have been implemented and those that will be implemented in the future.

2) Inclusion of several chemicals for which chemical-specific factors are not specified in the permit. These chemicals currently have a default emission factor of 1.0 and are either chemicals that were not previously used at Intel, or chemicals that have been used at Intel, but did not have previously established emission factors.
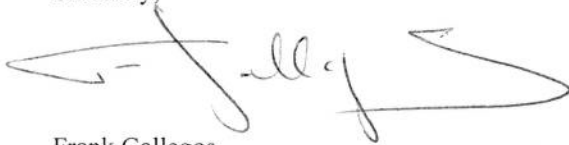
Enclosure 3 provides the detail for changes to the emission factors.

Permit Language Changes
Intel requests a number of minor revisions to the permit provisions for emergency generators, emissions calculations, thermal oxidizers, testing, recordkeeping and reporting. Enclosure 4 contains the requested changes.

Pursuant to 20.2.72.219.B.6 NMAC, Intel will provide notice by certified mail to all municipalities, Indian tribes, and counties within a ten-mile radius of the site and publish as required. Copies will be sent separately. Pursuant to 20.2.75.10.A, a check in the amount of $500.00 for the permit-filing fee will be sent separately. If you have any questions or need additional information, please contact Sarah Chavez at (505)794-4917.

Sincerely,
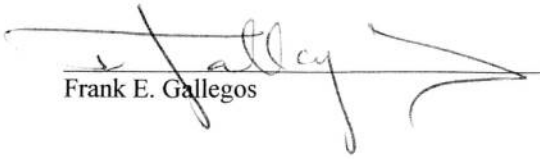
Frank Gallegos
NM Site Environmental, Health & Safety Manager

Enclosure 1: Boiler Emission Factor Data
Enclosure 2: Thermal Oxidizer Emission Factor Data
Enclosure 3: HAPs and VOC Emission Factor Explanation with Updated Emission Factors
Enclosure 4: Proposed Revisions to Permit Language

CERTIFICATION

I, Frank E. Gallegos, Intel Site EHS Manager, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.
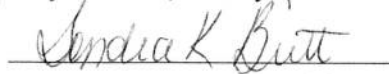
Frank E. Gallegos

STATE OF NEW MEXICO)
)ss.
COUNTY OF SANDOVAL)

Subscribed and sworn before me on this 15 day of March, 2010 by Frank E. Gallegos.

[My commission expires: MAY 12, 2012]

Enclosure 1

Boiler Emission Factor Data

Lever Position	2007		2008		2009		3 Yr Total	3Yr Average	Highest NOx EF per lever position (lb/MMBtu)	Highest CO EF per lever position (lb/MMBtu)
LF	1300	0%	755	0%	828	0%	2883	0%	0.0320	0.0002
2	5817	2%	3379	1%	7093	2%	16289	1%	0.0330	0.0000
3	56584	16%	27059	9%	47887	10%	131530	12%	0.0350	0.0000
4	96078	28%	71690	24%	126739	28%	294507	27%	0.0420	0.0000
5	93836	27%	100163	33%	158265	34%	352264	32%	0.0460	0.0003
6	72549	21%	68856	23%	84998	18%	226403	20%	0.0500	0.0002
7	17025	5%	27248	9%	29653	6%	73926	7%	0.0530	0.0006
8	2543	1%	5022	2%	4883	1%	12448	1%	0.0570	0.0008
9	111	0%	121	0%	246	0%	478	0%	0.0570	0.0007
10	41	0%	39	0%	44	0%	124	0%	0.0580	0.0009
									NOx Emission Factor (lb/MMBtu)	CO Emission Factor (lb/MMBtu)
					EFs – no change				0.04	0.0002

II. SUMMARY

A. Test Results

The results of the complete profile tests for Boiler No. blr-32-gd3-4 and single load positions for Boiler No. blr-32-gd3-6 are provided in *Table 4* and *Table 5*, respectively.

Table 4
Boiler No. blr-32-gd3-4 (Boiler 4)
Detailed Results of Emission Profile Tests

Setting	NO, ppm$_{dry}$	NO, Lbs/MMBtu	NO, Lbs/hr	CO ppm$_{dry}$	CO Lbs/MMBtu	CO Lbs/hr	O$_2$ %$_{dry}$	FR MMBtu/hr
10%	19.2	0.024	0.16	0.0	0.0000	0.00	3.70	6.40
20%	25.5	0.032	0.29	0.0	0.0000	0.00	3.76	8.99
30%	28.7	0.035	0.45	0.0	0.0000	0.00	2.98	12.81
40%	34.4	0.042	0.69	0.0	0.0000	0.00	2.90	16.51
50%	37.2	0.046	1.04	0.0	0.0000	0.00	3.40	22.46
60%	40.7	0.050	1.37	0.2	0.0001	0.00	3.07	27.55
70%	45.2	0.053	1.73	0.8	0.0006	0.02	2.54	32.36
80%	44.5	0.057	1.95	0.3	0.0002	0.01	3.81	34.40
90%	46.3	0.057	2.23	0.8	0.0006	0.02	3.27	39.04
100%	46.4	0.058	2.45	0.9	0.0007	0.03	3.50	42.40

Table 5
Boiler No. blr-32-gd3-6 (Boiler 6)
Detailed Results of Emission Profile Tests

Setting	NO, ppm$_{dry}$	NO, Lbs/MMBtu	NO, Lbs/hr	CO ppm$_{dry}$	CO Lbs/MMBtu	CO Lbs/hr	O$_2$ %$_{dry}$	FR MMBtu/hr
40%	27.8	0.035	0.62	0.0	0.0000	0.00	3.76	17.67

ERM

Enclosure 2

Thermal Oxidizer Emission Factor Data

Enclosure 2: Thermal Oxidizer Emission Factor Explanation

EF Explanation

Intel is currently operating two Durr thermal oxidizers and three Munters thermal oxidizers.

Durr Thermal Oxidizer
The emission factors for NOx and CO for the thermal oxidizers are determined using the standard methodology in the permit for calculating emission factors. The emission factors for NOx and CO are based on operational and testing data using the hourly maximum emission rates from the past two years of FTIR testing conducted during permit required compliance sampling and average natural gas consumption rate from the past two years, as reported to NMED in quarterly emissions reports. This approach is similar to the approach outlined in the permit to update the emission factors for the 1250 HP Boilers and will take into account any variability in the systems that may occur. The emission factor will be calculated as follows:

$$\frac{\text{Maximum 2 Year Testing Data (lb/hr)}}{\text{2 Year Average Operational Firing Rate data (MMBtu/hr)}} = \text{Emission Factor (lb/MMBtu)}$$

Below are the summary operational and testing data used to calculate the updated emission factors.

Munters Thermal Oxidizers
Intel is requesting that the AP-42 emission factors for NOx and CO as currently listed in Table 1 continue to be used for the Munters thermal oxidizers until there is two years of testing data and site specific emission factors can be developed.

Enclosure 2: Thermal Oxidizer Emission Factor Explanation

Operational and Testing Data for Durr Thermal Oxidizers

2008 Average Firing Rate (MMBtu/hr)	2009 Average Firing Rate (MMBtu/hr)	2 Year Average Firing Rate (MMBtu/hr)	2 Year Maximum NOx Emissions (lb/hr)	2 Year Maximum CO Emissions (lb/hr)	NOx Emission Factor (lb/MMBtu)	CO Emission Factor (lb/MMBtu)
1.45	1.57	1.51	0.515	0.181	0.34	0.12

Firing Rate (MMBtu/hr)	Rated Capacity	Jan'08	Feb'08	Mar'08	Apr'08	May'08	Jun'08	Jul'08	Aug'08	Sep'08	Oct'08	Nov'08	Dec'08
voc-16-np2-1 (Fab 11x Bridge)	2.5	1.41	1.45	1.46	1.47	1.48	1.50	1.32	1.47	1.43	0.93	1.45	1.44
voc-16-lt2-1 (Fab 11x Fab)	2.5	1.35	1.40	1.41	1.43	1.46	1.51	1.50	1.29	1.52	1.67	1.73	1.73

Firing Rate (MMBtu/hr)	Rated Capacity	Jan'09	Feb'09	Mar'09	Apr'09	May'09	Jun'09	Jul'09	Aug'09	Sep'09	Oct'09	Nov'09	Dec'09
voc-16-np2-1 (Fab 11x Bridge)	2.5	1.46	1.54	1.53	1.53	1.54	1.54	1.60	1.47	1.53	1.52	1.46	1.41
voc-16-lt2-1 (Fab 11x Fab)	2.5	1.63	1.65	1.63	1.67	1.71	1.78	1.68	1.57	1.66	1.59	1.44	1.43

Enclosure 2: Thermal Oxidizer Emission Factor Explanation

Thermal Oxidizer	Quarter	Date Tested	NOx (lb/hr)	CO (lb/hr)
Fab 11X-B	2008 Q1	3/7/2008	0.402	0.047
Fab 11X-B	2008 Q1	3/14/2008	0.369	ND
Fab 11X-B	2008 Q1	3/20/2008	0.398	0.029
Fab 11X-B	2008 Q2	5/9/2008	0.397	0.012
Fab 11X-B	2008 Q2	5/16/2008	0.346	0.012
Fab 11X-B	2008 Q2	5/22/2008	0.415	ND
Fab 11X-B	2008 Q3	9/3/2008	0.306	0.024
Fab 11X-B	2008 Q3	9/10/2008	0.305	0.041
Fab 11X-B	2008 Q3	9/16/2008	0.321	0.046
Fab 11X-B	2008 Q4	11/11/2008	0.389	0.053
Fab 11X-B	2008 Q4	11/18/2008	0.395	0.019
Fab 11X-B	2008 Q4	11/24/2008	0.405	0.029
Fab 11X-F	2008 Q1	2/21/2008	0.365	0.022
Fab 11X-F	2008 Q1	2/28/2008	0.482	0.036
Fab 11X-F	2008 Q1	3/5/2008	0.515	0.029
Fab 11X-F	2008 Q2	6/3/2008	0.366	0.018
Fab 11X-F	2008 Q2	6/10/2008	0.288	0.013
Fab 11X-F	2008 Q2	6/16/2008	0.344	0.046
Fab 11X-F	2008 Q3	8/15/2008	0.212	0.101
Fab 11X-F	2008 Q3	8/22/2008	0.434	0.181
Fab 11X-F	2008 Q3	8/29/2008	0.129	0.022
Fab 11X-F	2008 Q4	12/4/2008	0.13	0.042
Fab 11X-F	2008 Q4	12/11/2008	0.178	0.046
Fab 11X-F	2008 Q4	12/17/2008	0.162	0.056

	Fab 11X-B			Fab 11X-F		
Quarter	Date Tested	NO_x (lb/hr)	CO (lb/hr)	Date Tested	NO_x (lb/hr)	CO (lb/hr)
2009 Q1	02/20/09	0.362	0.015	02/20/09	0.090	ND
2009 Q1	02/27/09	0.397	0.023	02/26/09	0.128	0.033
2009 Q1	03/05/09	0.396	0.025	03/05/09	0.105	0.035
2009 Q2	04/15/09	0.303	0.025	06/02/09	0.106	0.017
2009 Q2	04/22/09	0.282	0.026	06/09/09	0.164	0.016
2009 Q2	04/28/09	0.282	0.028	06/16/09	0.121	ND
2009 Q3	08/20/09	0.213	0.018	08/19/09	0.108	0.007
2009 Q3	08/27/09	0.240	0.030	08/26/09	0.112	0.030
2009 Q3	09/02/09	0.227	0.036	09/01/09	0.086	0.037
2009 Q4	12/02/09	0.271	0.053	12/03/09	0.258	0.041
2009 Q4	12/09/09	0.291	0.037	12/10/09	0.281	0.048
2009 Q4	12/15/09	0.285	0.044	12/16/09	0.262	0.044

Enclosure 3
HAPs and VOC Emission Factor Explanation

Emission Factor Development

The following approach to emission factor development at the site is the same approach used in the October 1999 minor source permit application.

Semiconductor manufacturing is essentially a series of batch operations. Typically, a process step will be performed on a batch of wafers, the processing chamber will be emptied, and the next batch will be inserted to start the process over. A batch size at Intel can range from 1 - 25 wafers. For the selected process steps, emissions were tested over the course of several batches. Each time a batch is run, the process recipe is followed precisely, so the chemical inputs are known. During the course of the testing, emissions were measured directly from the individual tool each time a batch of wafers was run (see Attachment 1 for analytical procedure). This was typically repeated 5 - 10 times. The airflow in the tool exhaust was also measured prior to the start of the testing. The total mass of emissions (lbs.) was then calculated for the process step by determining the average concentration in the exhaust of the pollutant of concern, and multiplying by the air flow rate. Due to the very consistent nature of the process recipes, a very high degree of repeatability was observed among the multiple tests of an individual step.

The measured emissions were then converted into a simple emission factor as follows:

Emission factor = (measured output of chemical of concern)/(process recipe input of producing chemical).

For example, one process step uses 2.5×10^{-3} lbs. of chlorine gas for every wafer produced. The emissions testing on this step produced an average result of 8.3×10^{-5} lbs. hydrochloric acid (HCl) per wafer, and 1.8×10^{-3} lbs. chlorine (Cl2) per wafer. The emissions factors developed from these tests for this process step were:

EF Cl2 to HCl = $(8.3 \times 10^{-5})/2.5 \times 10^{-3}) = .03$
EF Cl2 to Cl2 = $(1.8 \times 10^{-3})/2.5 \times 10^{-3}) = .72$

In other words, on this process step every 100 lbs. of chlorine used will generate 3 lbs. of HCl emissions and 72 lbs. of Cl2 emissions.

The following are other example calculations for emission factors:

Example 1.

Ethyl lactate is used on lithography tracks. The amount of ethyl lactate used per wafer is rigorously defined for a given process and does not vary from wafer to wafer. Intel performed emissions testing on various manufacturing steps of the lithography track tools. This was performed with real time FTIR measurements during actual wafer manufacturing. On a given process step, anywhere from 5 to 25 wafers would be tested, over a total time of 5 – 60 minutes.

Six different lithography track steps were tested. The results of these tests and the way the data was turned into an overall ethyl lactate (EL) emission factor are shown below.

	EL Use lbs./wafer	EL Emissions lbs./wafer
Step 1	.00091	0.00023

Step 2	.00728	0.00160
Step 3	.00091	0.00018
Step 4	.00091	0.00018
Step 5	.00182	0.00036
Total	*.01183*	*0.00255*

Overall EF = total emissions/total use = .00255/.01183 = 0.22

All ethyl lactate emissions from this process are vented to the control devices. An efficiency of 97% was assumed, based on current tests results of those devices.

Emission Factor x (1 - % removal efficiency) = post abated emission factor

0.22 x (1-0.97) = 0.0066 lbs EL emissions/lb EL use

Example 2.

Since most HAPs chemicals are used on more than one process step, overall process emission factors were developed for all HAP producing chemicals used in the process. The overall emission factor defines the total amount of a given chemical on a given process which will be converted to a HAP. For example, if a given process step uses sulfur hexafluoride (SF_6) in three places, the overall emission factor will be determined by adding the results of all three of those process steps as shown below

Process Step	Chemical pathway	Chemical Use, lbs./wafer	Emissions, lbs./wafer
Etch 1	SF_6 to HF	2×10^{-3}	2×10^{-5}
Etch 2	SF_6 to HF	5×10^{-3}	1×10^{-5}
Etch 3	SF_6 to HF	3.5×10^{-3}	1.05×10^{-5}
Total		*1.05×10^{-2}*	*4.05×10^{-5}*

Overall EF = (total emissions/total use) = $4.05 \times 10^{-5} / 1.05 \times 10^{-2} = 0.004$

All hydrofluoric acid (HF) emissions from this process are vented to the control devices. An efficiency of 70% was assumed, based on current tests results of those devices.

Emission Factor x (1 - % removal efficiency) = post abated emission factor

0.004 x (1-0.70) = 0.0012 lbs HF emissions/lb SF_6 use

Removal Efficiencies

The efficiency of the abatement system is taken into account to calculate the overall emission factor after abatement using the following equation:

EF (after abatement) = EF (prior to abatement) x (100% - % abatement efficiency)

The abatement efficiencies listed below were used to derive the emission factors after abatement and were based on stack testing. The methanol use in the process has changed and therefore a 0% removal efficiency will now be used. This is due to inlet concentrations that would likely be below the limits of detection and therefore an efficiency can't be accurately determined. Other abatement efficiencies were not changed for this submittal.
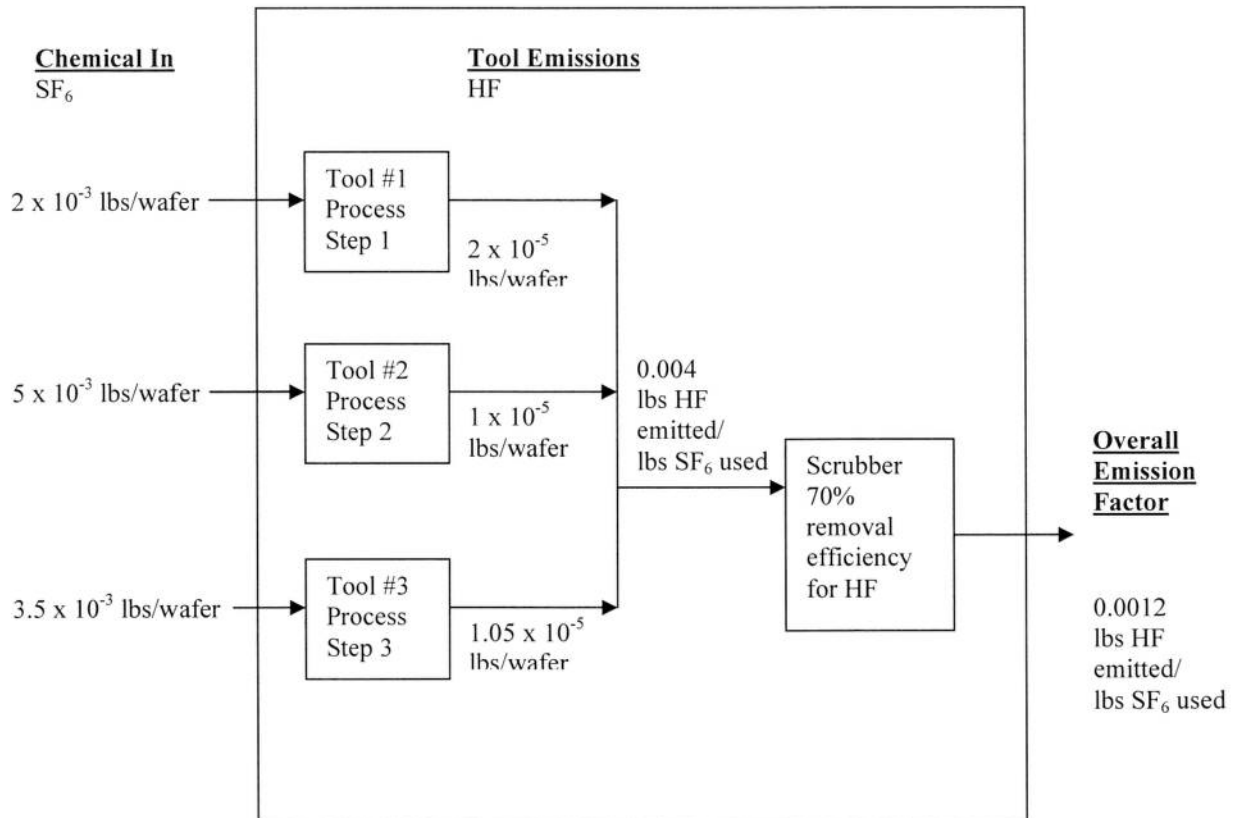
Methanol = 0%
Hydrofluoric Acid = 70%
Hydrochloric Acid = 69%
Chlorine = 53%
VOCs routed to thermal oxidizer (other than Methanol) = 97%
All other chemicals were assumed to have 0% abatement efficiency.

The following diagram depicts how the emission factor is calculated for Example 2 above:

Chemical In
SF_6

Tool Emissions
HF

2×10^{-3} lbs/wafer —→ Tool #1 Process Step 1

2×10^{-5} lbs/wafer

5×10^{-3} lbs/wafer —→ Tool #2 Process Step 2

1×10^{-5} lbs/wafer

3.5×10^{-3} lbs/wafer —→ Tool #3 Process Step 3

1.05×10^{-5} lbs/wafer

0.004 lbs HF emitted/ lbs SF_6 used

Scrubber 70% removal efficiency for HF

Overall Emission Factor

0.0012 lbs HF emitted/ lbs SF_6 used

Enclosure 3: HAPs and VOC Emission Factor Explanation

Emission Factors for HAPs[1]

Pollutant	Chemical or Precursor	Emission Factor			
		J[2]	I[2]	H[2]	G[2]
HF					
SF6 to HF	Sulfur Hexafluoride (SF6)	0.0009	0.0009		0.0047
CF4 to HF	Carbon Tetrafluoride (CF4)	0.0084	0.0084		0.0050
CHF3 to HF	Trifluoromethane (CHF3)	0.0184	0.0184		0.0337
C2F6 to HF	Hexafluoroethane (C2F6)	0.0057	0.0057		
NF3 to HF	Nitrogen Trifluoride (NF3)	0.0340	0.0022	0.0440	0.0025
WF6 to HF	Tungsten Hexafluoride (WF6)	0.0341	0.0005		0.0005
C4F8 to HF	Octafluorocyclobutane (C4F8)	0.0290	0.0290		0.0255
SiF4 to HF	Silicon tetrafluoride (SiF4)	0.1846	0.1846		
CH2F2 to HF	Difluoromethane (CH2F2)	0.0247	0.0247		0.0358
C5F8 to HF	Perfluorocyclopentene (C5F8)	0.0329	0.0329		0.0343
BF3 to HF	Boron Trifluoride (BF3)	0.2535	0.2535		0.2535
HF to HF	Hydrogen Fluoride (HF)	0.3000	0.3000		
CH3F to HF	Methyl Fluoride (CH3F)	0.2375	0.2375		
C4F6 to HF	Hexafluoro-1,3-butadiene (C4F6)	0.0100	0.0100		0.0508
HCl					
Cl2 to HCl	Chlorine (Cl2)	0.0500	0.0500		0.0835
BCl3 to HCl	Boron Trichloride (BCl3)	0.2889	0.2889		
DCE to HCl	Trans 1,2-Dichloroethene (DCE)	0.1004	0.1004		0.1004
DCS to HCl	Dichlorosilane (DCS)	0.0001	0.0001		0.0002
HCl	Hydrogen Chloride (HCl)	0.0722	0.0722		0.1302
11AVD to HCl	11AVD	0.1021	0.1021		0.1021
Cascade to HCl	Cascade	0.1021	0.1021		0.1021
TiCl4 to HCl	Titanium Tetrachloride	0.0024	0.0024		0.0024
Cl2					
Cl2	Chlorine (Cl2)	0.4372	0.4372		0.2921
BCl3 to Cl2	Boron Trichloride (BCl3)	0.4260	0.4260		
DCE to Cl2	Trans 1,2-Dichloroethene (DCE)	0.0940	0.0940		0.0940
Others					
1,4 dioxane	1,4 Dioxane	0.0000	0.0000	0.0000	0.0000
Carbitol Cellosolve	Carbitol Cellosolve	0.0004	0.0004		0.0004
EG	Ethylene Glycol	0.00001	0.00001	0.00001	0.00001
Cl2 to CCl4	Chlorine (Cl2)	0.00001	0.00001		0.0058
Methanol (Polyimide)	Methanol (Polyimide)	0.4526	0.4526		
Methanol (470)	Methanol (470)	0.1037	0.1037	0.1037	
PH3	Phosphine (PH3)	0.0003	0.0003		0.0050
AsH3	Arsine (AsH3)	0.0050	0.0050		0.0050
TiCl4 to TiCl4	Titanium Tetrachloride	0.0000	0.0000		0.0000
Bromoform3	Sodium Bromide – CUB	0.0605			
Bromoform3	Sodium Bromide – NEC	0.0096			
LCP Oxide Etch to NH34	LCP Oxide Etch	0.0008			
LCP Oxide Etch to NOx5	LCP Oxide Etch	0.0005			
Any Other HAP Listed In Appendix X[6]		1			

Notes:

[1] Emission factors take into account control efficiencies, where applicable. Chemicals having emission factors equal to zero (0.0) are either completely consumed in the process, are solid sources with negligible vapor pressures or have no detectable emissions during tool testing. Intel may revise the emission factors following Condition 1.G. EFs for processes no longer in use have been removed from this table.

[2] G, H, I and J are unique processes.

[3] Site EF, not associated with a single process.

[4] NH3 is not a HAP but will be reported with TAP emissions.

[5] NOx is not a HAP but will be reported with site NOx emissions.

[6] This category does not include those HAPs chemicals for which Intel uses the sink evaporation equation specified in Condition 5.D.iv to calculate emissions.

"-"Chemical not used on this technology.

Emission Factors for VOCs[1]

Pollutant	Emission Factors			
	J[2]	I[2]	H[2]	G[2]
1-Amino-2-Propanol (MIPA)	0.000004	0.000004		
1,4-Cyclohexanedimethanol vinyl ether	0.0300	0.0300	0.0300	0.0300
1,4 dioxane	0.0000	0.0000	0.0000	0.0000
1-Heptanethiol	0.0004	0.0004	0.0004	0.0004
2-Ethyl 1-Hexanol	0.0004	0.0004	0.0004	0.0004
Acetic acid	0.0000	0.0000	0.0000	0.0000
Acetonitrile	1.0000	1.0000	1.0000	1.0000
2-Heptanone	0.0135	0.0135	0.0166	0.0166
Bis(tertbutylamino)silane (BTBAS)		0.0000		0.0000
BTBAS to t-butylamine		0.0159		0.0159
Methyl Fluoride (CH3F)	1.0000	1.0000		
CF4 to Hexafluoro-1,3-butadiene (C4F6)		0.0002		
C4F8 to Hexafluoro-1,3-butadiene (C4F6)		0.0051		0.0038
Carbitol Cellosolve	0.0004	0.0004		0.0004
CH2F2 to Hexafluoro-1,3-butadiene (C4F6)		0.0067		0.0104
CHF3 to Hexafluoro-1,3-butadiene (C4F6)		0.0001		
Cyclohexanone	0.0027	0.0027	0.0017	0.0058
Diethyl Ketone	0.0026	0.0026		
Dimethyl amine (DMA)	1.0000	1.0000	1.0000	1.0000
Dimethyldimethoxysilane (DMDMOS)	0.0162	0.0162		0.0153
Ethanol	0.0155	0.0155		0.0146
Ethylene Glycol	0.00001	0.00001	0.00001	0.00001
Ethyl Lactate	0.0135	0.0084	0.0166	0.0055
Gamma-Butyrolactone	0.0058	0.0058		0.0058
Hexafluoro-1,3-butadiene (C4F6)	0.0926	0.0926		0.1226
Hexamethyldisilazane (HMDS)	0.0162	0.0163	0.0163	0.0163
Diisoamyl Ether	0.0058	0.0058		0.0058
IPA - Bulk	0.0027	0.0058	0.0083	0.0062
IPA - SLAM	0.0164	0.0164		0.0166
IPA - parts clean	0.0141	0.0141	0.0141	0.0141
Methanol (Polyimide)	0.4526	0.4526		
Methanol (470)	0.1037	0.1037	0.1037	
Methyl Isobutyl Carbinol	0.0058	0.0058		0.0058
n-Butanol	0.0049	0.0049		0.0049
1-Methyl-2-pyrrolidinone (NMP)	0.0005	0.0005		
1-Methyl-2-pyrrolidinone (Polyimide)	0.0005	0.0005		
1-Methyl-2-pyrrolidinone - (470)	0.00001	0.00001	0.00001	
N, N-Di-n-butylaniline	0.0300	0.0300		0.0300
PDMAT to DMA	0.3081	0.3081		0.3081
Perfluorocyclopentene (C5F8)	0.1472	0.1654		0.1472
Propylene Glycol Monomethyl Ether (PGME)	0.0105	0.0167	0.0107	0.0058
Propylene Glycol Monomethyl Ether Acetate (PGMEA)	0.0122	0.0122		0.0059
Propene (C3H6)	0.1883	0.1883	0.1883	0.1883
Sulfolane	0.0000	0.0000	0.0000	0.0000
Tetrakis(dimethylamino)titanium (TDMAT) to DMA	0.8043	0.8043		0.8043
Tetramethylsilane	0.0043	0.0043		0.0100
Trans 1,2-Dichloroethene (DCE)	0.0000	0.0000	0.0000	0.0000
Triflic Acid	0.0300	0.0300		0.0300

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Trimethyl Aluminum		1.0000		1.0000
Process CO (lb/ws)	0.0002	0.0050	0.0002	0.0034
Process NOx (lb/ws)	0.0003	0.0061	0.0003	0.0137
Any Other VOC chemicals[4]		1		

Notes:

[1] Emission factors take into account control efficiencies, where applicable. Chemicals having emission factors equal to zero (0.0) are either completely consumed in the process, are solid sources with negligible vapor pressures or have nodetectable emissions during tool testing. Intel may revise the emission factors following Condition 1.G. EFs for processes no longer in use have been removed from this table.

[2] G, H, I and J are unique processes.

[3] Carbon Monoxide is not a VOC but will be reported with site CO emissions.

[4] This category does not include those VOC chemicals for which Intel will use the sink evaporation equation specified in Condition 4.D.iv.a to calculate emissions.

"-"Chemical not used on this technology.

Emission Factor Weighting

At Intel, multiple manufacturing processes are being run at any given time. Each manufacturing process may use chemicals in different quantities and have a different emission factor. In order to more accurately calculate emissions, emission factors for each individual manufacturing process are being proposed for inclusion in the permit and are included in Tables 3 and Z above. To calculate emissions each quarter, the actual production level will be used to allocate the chemical use for the site to the various processes. This approach to weighting is the same approach that was submitted and explained in the August 2002 emission factor update. The weighted average is calculated as follows:

$$WA_A (\%) = \frac{CU_A \times WS_A}{(CU_A \times WS_A + CU_B \times WS_B + CU_C \times WS_C + ...)}$$

where:
WA_A = Weighted average for Process A (%)
CU_A = Chemical Usage for Process A (pounds/wafer processed)
WS_A = Actual production level for Process A (wafers processed/quarter)
CU_B = Chemical Usage for Process B (pounds/wafer processed)
WS_B = Actual production level for Process B (wafers processed/quarter)

The weighted average (%) for process A is the chemical usage for process A multiplied by the actual production level for process A divided by the sum of the chemical used for individual processes multiplied by the actual production level for the individual processes.

Emissions for a particular chemical would then be calculated as follows:

$$Site\ Emissions_1 = WA_A \times EF_A \times ACU_1 + WA_B \times EF_B \times ACU_1 + WA_C \times EF_C \times ACU_1 + ...$$

where:
$Site\ Emissions_1$ = Emissions for Chemical 1 (i.e. chlorine, methanol)
WA_A = Weighted average for Process A (%)
EF_A = Emission Factor for Process A
ACU_1 = Actual chemical use for Chemical 1 (i.e. chlorine, methanol)
WA_B = Weighted average for Process B (%)
EF_B = Emission Factor for Process B

The site emissions for chemical 1 (i.e. chlorine) is the total of the weighted average (%) for an individual process multiplied by the emission factor for the individual process multiplied by the actual chemical use for chemical 1.

The following table and equations provide an example calculation for site emissions of HF from SF_6:

Enclosure 3: HAPs and VOC Emission Factor Explanation

	Process A	Process B	Process C	Process D	Site
Production (wafers processed/quarter)	5000	750	1000	2000	
Chemical Usage for Process (lbs SF_6 /wafer processed)	2.01E-02	1.37E-02	1.05E-02	5.24E-03	
Weighted Average for Process (%)	76%	8%	8%	8%	
Emission Factor for Process	0.0074	0.024	0.0079	0.0051	
Actual Chemical Usage SF_6 (lbs)					140
Emissions HF (lbs)					6.2

The following calculation shows the how the weighted average for Process A is determined:

$$WA_A = \frac{5000 x 2.01E - 02}{5000 x 2.01E - 02 + 750 x 1.37E - 02 + 1000 x 1.05E - 02 + 2000 x 5.24E - 03} = 76\%$$

The following calculation shows how the site emissions for HF from SF_6 would be determined:

$$SiteEmissionsHF = 0.76 x 0.0074 x 140 + 0.08 x 0.024 x 140 + 0.08 x 0.0079 x 140 + 0.08 x 0.0051 x 140 = 6.2 lbsHF$$

Attachment 1

Analytical Method used for Tool Testing

The following is an excerpt outlining the analytical method used for tool testing. This document is updated frequently and is subject to change.

http://www.sematech.org/docubase/document/4825beng.pdf

Enclosure 4

Proposed Revisions to Permit Language

Emergency Generators

Intel is requesting that the requirements for the emergency generators be modified as follows:

> 2.C.iii. Emergency Generators
>
> a. ~~Testing of the diesel fuel delivery system and emergency generator operation shall be in accordance with the NFPA 110, Standard for Emergency and Standby Power Systems.~~
>
> b. ~~Testing of the diesel fuel delivery system and fire pump operations shall be in accordance with NFPA 25, Standard for Inspection, Testing and Maintenance for Water-based Fire Protection Systems and insurance requirements.~~
>
> ***a.*** ***Testing of the emergency generators and fire pumps shall be limited to thirty (30) minutes each per month.***
>
> ***b***~~c~~. Intel shall not use the emergency generators for more than five hundred (500) hours each per year unless Intel obtains a permit revision allowing such use. For record-keeping requirements on emergency generator use, see Condition 8 of this Permit.

These changes eliminate requirements that are not related to protecting air quality and will make the conditions consistent with those for emergency generators at other permitted facilities in New Mexico.

Thermal Oxidizers

Intel is requesting that the following condition for the thermal oxidizers be modified as follows:

> 4.C.vi. Intel shall operate each control unit in accordance with manufacturer's specifications. At all times a thermal oxidizer unit is in operation, except during startup and cooldown periods, ***and when VOC exhaust has been routed to another unit***, Intel shall maintain the temperature of the Durr thermal oxidizers primary combustion chamber at a minimum of 1350°F, and a single hour average of at least 1360°F, plus or minus 10°F and the temperature of the Munters thermal oxidizers primary combustion chamber at a minimum of 1370°F, and a single hour average of at least 1385°F, plus or minus 15°F. At all times a bead activated carbon unit is in operation, except during startup, Intel shall maintain the desorption chamber temperature at a minimum of 300°F and the coolant return temperature at a maximum of 50°F. Intel shall continuously record the temperatures using a continuous strip chart recorder or electronic equivalent. At any time the continuous recording mechanism is not operating, Intel shall record the temperatures not less than once per hour during the time the control unit is operating.

This change will allow VOC exhaust to be routed to a another thermal oxidizer and eliminate the need to report these events as equipment downtime under Condition 9.A.vi.

Emissions Calculations

Intel is requesting that the following conditions for emission calculations be modified as follows:

> 4.D.iv.a Emissions from the liquid chemical baths shall be calculated for each VOC using the standard evaporation rate equation recognized by EPA for use in compliance with Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the federal Act ***or as specified in Condition 4.D.iv.b***. This equation is:
>
> 5.D.iv. Emissions from the liquid chemical baths shall be calculated for each HAP using the standard evaporation rate equation recognized by EPA for use in compliance with Section 313 of

the Emergency Planning and Community Right-to-Know Act (EPCRA), Section 112(r) of the federal Act and other applications *or as specified in Condition 5.D.v.* This equation is:

This change will allow the use of emission factors based on tool testing for liquid chemical baths.

Testing

Intel is requesting that the following conditions for testing be modified as follows:

5.E.iii.   Unless the Department approves otherwise, Intel shall conduct additional tests for HAPs if their emissions are calculated according to the equation in 5.D.v and one of the following circumstances exist: either the emission factor is already less than 1 and is being reduced, or the use of the HAP has just begun with an emission factor less than 1. Such tests shall be conducted within *the next calendar quarter* thirty (30) days of *after* the change.

7.A.ii.   The initial stack tests and the first set of annual stack tests shall be completed within one hundred eighty (180) days of the date of issuance of this Permit. All testing of HAPs emissions during the initial and annual test periods shall be started and completed within a period of *one calendar quarter* sixty (60) continuous days. All tests of stacks within a Fab shall be completed prior to commencing tests in other Fabs unless tests of all stacks occur in other Fabs simultaneously.

7.B.v.   Intel shall conduct tests in accordance with applicable EPA Reference Methods 1 through 4, Method 5 for particulate matter, Method 25A for VOCs, Method 7E for NOx, and Method 10 for CO contained in 40 CFR 60, Appendix A, and with the requirements of 40 CFR 60.8(f) *when testing new boilers*. The results of the NOx tests shall be expressed as nitrogen dioxide (NO2) using a molecular weight of 46 lb/lb-mole in all calculations (each ppm of NO/NO2 is equivalent to 1.194 x 10-7 lb/scf).

7.C.ii.   Intel shall operate and maintain *conduct an* emissions testing system to measure the concentration of total hydrocarbons and VOCs and the air flow from each stack. Intel shall begin operation of the emissions testing system no later than ninety (90) days following issuance of this permit.

7.D.iii   For the tests required by Condition 7.D, Intel shall use EPA Compendium Method IP-9 or a FTIR for HCl and HF, EPA Method 26A for Cl2, or other methods approved by the Department. For all other HAPs, Intel shall use test methods approved by the Department. The duration of the test for each stack shall be no less than eight (8) continuous hours *constituted by consecutive 4 hour measurements*, unless otherwise approved by the Department. For these tests, Intel shall comply with the notification requirements specified in Condition 7.A.i.

7.E.ii.   Intel shall conduct initial compliance testing for NH3 *emissions*.

Changes to Condition 5.E.iii will makes this condition consistent with the amount of time allowed to complete the testing specified in Condition 7.A.ii.

Changes to Condition 7.A.ii will allow adequate time to complete the testing. This is needed because the Munters thermal oxidizers have twice as many stacks as the Durrs making completing thermal oxidizer and scrubber testing in 60 days difficult.

Changes to Condition 7.C.ii clarify that Intel is allowed to use a third party consultant to perform the emissions testing on the BAC and RTO units.

Changes to Condition 7.B.v clarify that 40 CFR 60.8(f) applies only to testing on new boilers.

Changes to Condition 7.D.iii clarify that the eight (8) continuous hours of testing required will consist of two four (4) hour measurement periods that are necessary for EPA Method 26A for Cl2.

Changes to Condition 7.E.ii clarify that testing for NH3 is for NH3 emissions.

Recordkeeping

Intel is requesting that the condition be modified as follows:

> 8.A.iii.   Intel shall keep records of the production level, expressed as percentage of full capacity, of each Fab. The records of any solvent ***VOC air pollution control unit*** exhaust stack test or acid gas scrubber exhaust stack test shall include the associated production level expressed as percentage of full capacity of that Fab.

The change to Condition 8.A.iii clarifies that records are required when the solvent VOC air pollution control unit is tested. This language is consistent with Condition 4.C.

Reporting

Intel is requesting that the conditions be modified as follows:

> 9.A.ii.   The result of any partial or complete test conducted as a requirement of a condition of this Permit or conducted to demonstrate compliance with a condition of this Permit shall be submitted ***electronically*** to the Department within thirty (30) days after the completion of the test. ~~Two copies of any solvent exhaust test report shall be submitted to the Department.~~ The results of testing required in condition 5.E.i shall include the parameters of the evaporation rate equation recorded during the test.

> 9.A.iii.e. test results obtained for the period of testing ***the solvent VOC air pollution control unit exhaust stacks*** ~~using the solvent exhaust VOC testing system~~, including:

> > 1)   the exhaust flow rate (in dry standard cubic feet per hour) and temperature (in degrees Fahrenheit); and

> > 2)   for each solvent ***VOC air pollution control unit*** exhaust stack, the average total hydrocarbon and VOC concentrations (in parts per million volume, dry basis) and average emission rate of VOCs in pounds per hour;

Changes to Condition 9.A.ii requires electronic reporting of testing reports, rather than hard copies. This change has been requested by NMED.

The change to Condition 9.A.iii.e makes the language consistent throughout the permit and specifes that information is needed for the solvent VOC air pollution control unit stacks. This language is consistent with Condition 4.C.